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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/016,437	12/10/2001	Nader Dutta	594-25576	5333
7590	08/10/2005		EXAMINER	
Jeffrey E. Griffin WesternGeco Intellectual Property Department 10001 Richmond Ave. Houston, TX 77042			JONES, HUGH M	
			ART UNIT	PAPER NUMBER
			2128	

DATE MAILED: 08/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.	Applicant(s)
	10/016,437	DUTTA ET AL.
	Examiner Hugh Jones	Art Unit 2128

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE \_\_\_\_ MONTH(S) FROM  
THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

1) Responsive to communication(s) filed on 10 December 2001.  
 2a) This action is **FINAL**.                            2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

4) Claim(s) 1-27 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_ is/are allowed.  
 6) Claim(s) 1-27 is/are rejected.  
 7) Claim(s) \_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on 10 December 2001 is/are: a) accepted or b) objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

1) Notice of References Cited (PTO-892)  
 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)  
 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
     Paper No(s)/Mail Date \_\_\_\_

4) Interview Summary (PTO-413)  
     Paper No(s)/Mail Date \_\_\_\_

5) Notice of Informal Patent Application (PTO-152)  
 6) Other: \_\_\_\_

## DETAILED ACTION

1. Claims 1-27 of U. S. Application 10/016,437, filed 12/10/2001, are presented for examination.

### Information Disclosure Statement

2. Applicants have not provided an information disclosure statement. However, it is noted that Inventor Mallick has an extensive publication record in the art which has been claimed including the application of genetic algorithms to prestack wavefrom inversion, none of which has been provided to the office. Applicants are reminded of their duty to disclose under 1.56 and 1.105.

### Drawings

3. Figure 1-8 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance. For example, Fig. 5 is exactly identical to Figure 1 of Mallick (1995). In another example, figure 1, see the third paragraph on page 1 of the specification.

**Claim Rejections - 35 USC § 112**

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 15 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 15 recites evaluating changes in polarity. The meaning of polarity is unknown; polarity of what?

**Claim Rejections - 35 USC § 102**

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

7. Claims 1-27 are rejected under 35 U.S.C. 102(a) as being clearly anticipated by Mallick (6/2001).

8. Mallick (one of the inventors) discloses prestack waveform inversion using a genetic algorithm including:

a method for determining shallow water flow risk using seismic data comprising (abstract; SWF – pg. 81, col. 2; page 82, col. 1; fig. 12):  
processing the seismic data to enhance its stratigraphic resolution (“Prestack Waveform Inversion” and “Applications of Prestack Waveform Inversion” pp. 79-82);

selecting a control location comprising:

performing a stratigraphic analysis on the seismic data (abstract; "Prestack Waveform Inversion" and "Applications of Prestack Waveform Inversion" pp. 79-82; pg. 80, col. 2); and

evaluating the seismic attributes of the seismic data ("Prestack Waveform Inversion" and "Applications of Prestack Waveform Inversion" pp. 79-82);

applying a pre-stack waveform inversion on the seismic data at a selected control location to provide an elastic model, wherein the elastic model comprises pressure-wave velocity and shear-wave velocity ("Prestack Waveform Inversion" and "Applications of Prestack Waveform Inversion" pp. 79-82); and

applying a post-stack inversion on the seismic data using the elastic model ("Prestack Waveform Inversion" and "Applications of Prestack Waveform Inversion" pp. 79-82); and determining the shallow water flow risk using the post-stack inverted elastic model to compare the pressure-wave velocity to the shear-wave velocity ("Prestack Waveform Inversion" and "Applications of Prestack Waveform Inversion" pp. 79-82).

wherein the pre-stack waveform inversion comprises using a genetic algorithm comprising:

generating a plurality of elastic earth models (pg. 79),

generating pre-stack synthetic seismograms for the elastic earth models (pg. 79);

matching the generated seismograms with the seismic data ("Prestack Waveform Inversion" and "Applications of Prestack Waveform Inversion" pp. 79-82);

generating a fitness for the elastic earth models (pg. 79);

genetically reproducing the elastic earth models using the fitness for the elastic earth models (pg. 79), and

determining convergence of the reproduced elastic earth models to select the elastic model ("Prestack Waveform Inversion" and "Applications of Prestack Waveform Inversion" pp. 79-82),

wherein processing the seismic data comprises using an algorithm with amplitude preserving flow (bottom of col. 2, page 81),

wherein the elastic model further comprises attribute of Poisson's ratio (fig. 10),

wherein the control location comprises a plurality of control locations (pg. 81; "Prestack Waveform Inversion" and "Applications of Prestack Waveform Inversion" pp. 79-82),

wherein performing the stratigraphic analysis comprises using the model to identify a geologic feature ("Prestack Waveform Inversion" and "Applications of Prestack Waveform Inversion" pp. 79-82),

wherein evaluating seismic attributes comprises using AVO techniques (abstract; pg. 80, col. 2).

**Claim Rejections - 35 USC § 103**

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. Claims 1-5, 7-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mallick (3/1999) in view of Huffman.

12. Mallick discloses all limitations, as subsequently discussed, but does not expressly disclose the application of the technique to Shallow Water Flow (SWF).

13. Huffman discloses a method for identification of shallow water flow hazards using seismic data (see title), using the same types of techniques.

14. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the Mallick teaching to include the Huffman teaching because Huffman disclose in the "background of the art" that there is a need to identify SWF prior to drilling a borehole.

15. Specifically, Mallick discloses:

a method for determining shallow water flow risk using seismic data comprising ("Genetic Algorithm – a Practical Implementation – pp. 326-330);

processing the seismic data to enhance its stratigraphic resolution ("Genetic Algorithm – a Practical Implementation – pp. 326-330); selecting a control location comprising:

performing a stratigraphic analysis on the seismic data ("Genetic Algorithm – a Practical Implementation – pp. 326-330); and

evaluating the seismic attributes of the seismic data ("Genetic Algorithm – a Practical Implementation – pp. 326-330);

applying a pre-stack waveform inversion on the seismic data at a selected control location to provide an elastic model, wherein the elastic model comprises pressure-wave velocity and shear-wave velocity ("Genetic Algorithm – a Practical Implementation – pp. 326-330); and

applying a post-stack inversion on the seismic data using the elastic model; and determining the shallow water flow risk using the post-stack inverted elastic model to compare the pressure-wave velocity to the shear-wave velocity ("Genetic Algorithm – a Practical Implementation – pp. 326-330).

wherein the pre-stack waveform inversion comprises using a genetic algorithm ("Genetic Algorithm – a Practical Implementation – pp. 326-330) comprising:

generating a plurality of elastic earth models ("Genetic Algorithm – a Practical Implementation – pp. 326-330),

generating pre-stack synthetic seismograms for the elastic earth models ("Genetic Algorithm – a Practical Implementation – pp. 326-330);

matching the generated seismograms with the seismic data ("Genetic Algorithm – a Practical Implementation – pp. 326-330);

generating a fitness for the elastic earth models ("Genetic Algorithm – a Practical Implementation – pp. 326-330);

genetically reproducing the elastic earth models using the fitness for the elastic earth models ("Genetic Algorithm – a Practical Implementation – pp. 326-330), and

determining convergence of the reproduced elastic earth models to select the elastic model ("Genetic Algorithm – a Practical Implementation – pp. 326-330),

wherein processing the seismic data comprises using an algorithm with amplitude preserving flow ("Genetic Algorithm – a Practical Implementation – pp. 326-330),

wherein the elastic model further comprises attribute of Poisson's ratio (pg. 330, col. 2),

wherein the control location comprises a plurality of control locations (pg. 330),

wherein performing the stratigraphic analysis comprises using the model to identify a geologic feature ("Genetic Algorithm – a Practical Implementation – pp. 326-330).

wherein evaluating seismic attributes comprises using AVO techniques ("Genetic Algorithm – a Practical Implementation – pp. 326-330).

16. Claims 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over

Mallick (3/1999) in view of Huffman and in further view of Tygel et al..

17. Mallick discloses all limitations, as discussed, but does not expressly disclose the use of amplitude preserving techniques.

18. Tygel et al. discloses the use of amplitude preserving techniques (page 945, top of middle column).

19. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the Mallick teaching to incorporate the Tygel et al. teaching because Tygel et al. disclose that the use of amplitude preserving techniques reduce the deleterious effects of aliasing (page 945, top of middle column), in the same context.

### Conclusion

20. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The art is not applied because it is cumulative to the applied art.

- Mallick: Model-based inversion of amplitude-variations with off set data using a genetic algotihm; Geophysics; pp. 939-954; 1995.

21. Any inquiry concerning this communication or earlier communications from the examiner should be:

directed to: Dr. Hugh Jones telephone number (571) 272-3781,

Monday-Thursday 0830 to 0700 ET,

Art Unit: 2128

**or**

the examiner's supervisor, Jean Homere, telephone number (571) 272-3780.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist, telephone number (703) 305-3900.

**mailed to:**

Commissioner of Patents and Trademarks

Washington, D.C. 20231

**or faxed to:**

(703) 308-9051 (for formal communications intended for entry)

**or** (703) 308-1396 (for informal or draft communications, please label *PROPOSED* or *DRAFT*).

Dr. Hugh Jones  
Primary Patent Examiner  
July 23, 2005

*Hugh Jones, Ph.D.*  
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